CPM gets sharper edge as management tool

One of the ironies of the Critical Path Method (CPM) after it appeared on the construction scene about 1958 and in the ensuing years was that many network diagrams quietly ended up in the waste basket. The complicated diagrams and voluminous computer printouts defeated themselves because engineers and building trade supervisors reverted to "the way we've been doing it for years"—experience and the bar graph.

One CPM consultant, however, didn't exactly relish seeing his work end up in the garbage can even though he was getting paid for it. As director of project management information systems in the Chicago office of Tishman Realty and Construction Co., Inc., New York City, Chandra Jha developed a streamlined, less cumbersome CPM (see box, p. 50) that Tishman management routinely uses to keep projects on schedule. The system, called TISHCOM, keeps up with the actual work in the field, something many traditional CPM programs can't do.

TISHCOM uses basic CPM network techniques, but differs from traditional CPMs in its development and use. Essentially, Jha's system is a three-level CPM that gives each member of project management information covering only his particular aspect of the job, from the steel work supervisor up to John Tishman, executive vice president in charge of construction. The system aims at getting the right information to the right people so effective decisions can be made at all management levels.

Instead of John Tishman getting a stack of printouts, which he ordinarily would receive with conventional CPM, he gets a 10-item, one-page printout in the form of a bar chart that summarizes the entire project. If he wants to check on a lagging portion of the job—the computer flags with an asterisk those items that are more than the allowed time behind schedule—Tishman can call his project manager in the field to determine the problem. This middle-manager has a computer-created bar chart containing many more items that are the detailed breakdown of items in John Tishman's printout (see example below). This expanded chart is seldom more than five pages, compared to a conventional system that might generate 200 pages.

The third level of management, consisting of Tishman and subcontractor supervisors, receive a computer printout covering only their work items and listing only the start and finish dates and slippage time for each item.

By programming for this three-level printout, Jha has solved one of CPM's major problems, that of getting field people to use the system. With TISHCOM, a supervisor must keep only the start and completion dates for work items within the most recent four to six weeks in front of himself. All other information such as float time is eliminated from his report. Conversely, with a conventional CPM usually a supervisor can't read the detailed printout and many times a contractor has to hire a CPM consultant to disseminate the information for decision-making.

No trouble reading. Neither do the project engineers have any trouble reading the computerized bar charts nor do they get hundreds of pages of printout that they would receive with traditional CPM. The three-level breakdown of information distribution eliminates repetition and the bar charts don't create a lot of paper work.

The bar chart is printed in letters that form the bar of the chart, the letters signifying progress. Also printed are the completion or target dates and the data line, which is the date of compilation, and the float time, which is

SYS CDE	DESCRIPTION	PROG RESS	ACTL.ST. DATE	FEB MAR APR MAY JUN JUL AUG SEP	TARGET DATE	SLIP-WKS TOTAL	SLIP-WKS CUR
05	SUPERSTR-ABOVE PLAZA	FL24	07/06/70	AAAEEEEEEEEEEEL	03/26/71	6.0	1.6
09	FACIA WALL	FL16	07/24/70	AAAEEEEFEEEEEEEEEEEE----L	06/14/71	2.0	
11	WINDOW WALL	FL09	12/28/70	AAAEEEEFEEEEEEEEEEEEEE-------L	07/19/71		
13	HVAC PERIMETER SYSTEM		12/01/70	AAAEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE	09/13/71	7.2	2.6
15	HVAC INTERIOR SYSTEM		11/10/70	AAAEEEEEEEEEEEEEEEEEEEEE----------			
17	MECH RM-2ELCW SYS CPEN		12/01/70	AAAEEEEEEEEEEEEEEEEEEEEEEEEEEEELF	07/30/71	7.6	2.6
19	MECH RM-1&UP, SYS OPEN			EEEEEEEEEEEEEEEEEEEEE	10/11/71	5.0	4.0

Bar chart printout for upper management, made up of letters (A-activities completed, E-expected completion . . .

17D	REHEAT COILS TEMP.CONTR	12/21/70	AAAAEEEEEEEEEEEEEEEEEEEE----------		
17A	MECH EQ & PIPING FL 2	12/08/70	AAAAEEEEEEEEEEEEEEEE-----L	04/30/71	5.6* 1.2
17B	FANS & DUCTW PR FL 2	12/31/70	AAAAEEEEEEEEEEEEEE---------L	04/30/71	4.4* 1.4
17C	INSULATE EQPIPING FL-2		EEEEEEEEEEEEEEEEEE------L		
17D	TEMP CONTROL FL 2		EEEEEEEEEEEEEEEEEEEEEEEEL		
17E	ELCTP WIRING FL 2	11/22/70	AAAAEEEEEEEEEEEEEE------I		
17F	COMPLETE MECH. RM. FL-2		E-----L	04/30/71	5.8* 1.2
17G	FLOW HVAC SYS SHAKEDOWN		EEEEEEE	07/30/71	2.6 2.6
19A	[illegible]				

...lation, and dash-float time) is expanded for middle management members.

the number of weeks between earliest completion and latest completion dates.

Says Charles DeBenedittis, Tishman's senior vice president in charge of construction, "With TISHCOM, we can monitor all projects across the country by looking at a few computer bar charts every month, and we don't interfere with each project manager's technique. We just make sure he's on schedule and that's all we care about."

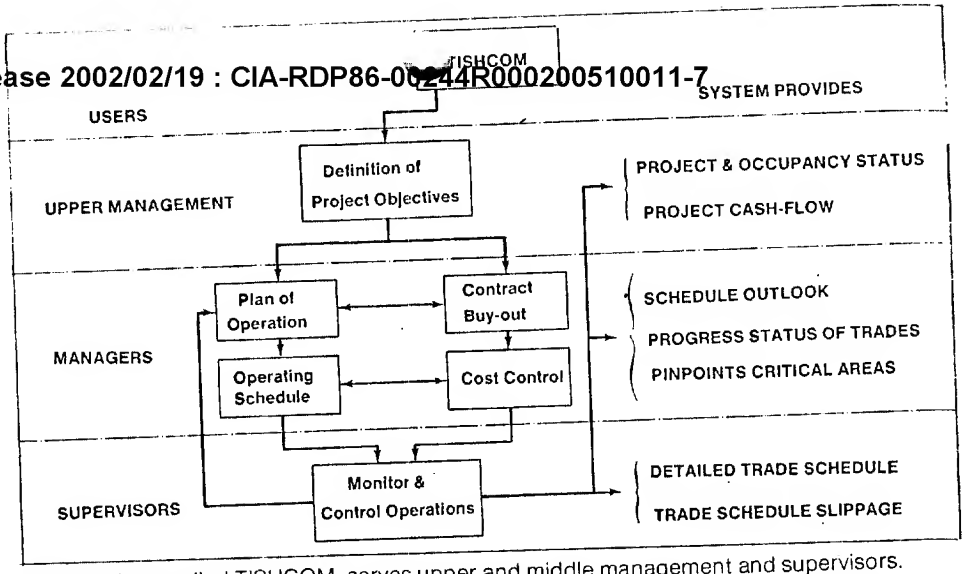
Updating. When conventional CPM is used the printouts are sometimes weeks behind actual construction because updating of all items consumes so much time. TISHCOM is updated weekly in the field when the supervisors have a meeting with Tishman's middle manager. The supervisors merely indicate whether a job is completed or the number of weeks it's behind schedule. Once every month the program is run.

"With the system we work up to a change. We are aware of slippage and possible delays weekly," says S. Gordon Hanson, project manager for Tishman on a 36-story building under construction in Chicago.

In addition to the changes in the information TISHCOM provides, it also accommodates improvement in planning, according to M.E. Oppenheim, vice president in the Tishman Chicago office. "The whole job is planned in skeleton form—what we call a milestone chart—comprising only those immediate operations on the job," says Oppenheim. When traditional CPMs are used, the whole job, including all details, is planned before the actual construction gets under way, resulting in loads of paper work and time-consuming changes.

Between the TISHCOM milestone steps, changes can easily be made or operations added. For instance, if the job is scheduled to start in six months, then the detailed CPM is set up for the foundation work and placing of first steel. Says Oppenheim, "We don't start worrying about the 30th floor until steel is up to the 25th floor or so. And I don't need CPM printouts that would go along with placing steel on the 30th floor until workers are up to that level."

When TISHCOM is used, the subcontractors and contractors meet with Tishman management before construction starts to set up the detailed CPM. The contractors provide realistic time schedules that are then incorporated into the system. Later, more details are filled in as the job progresses.



CPM system, called TISHCOM, serves upper and middle management and supervisors.

Engineer-businessman pulls CPM out of garbage can

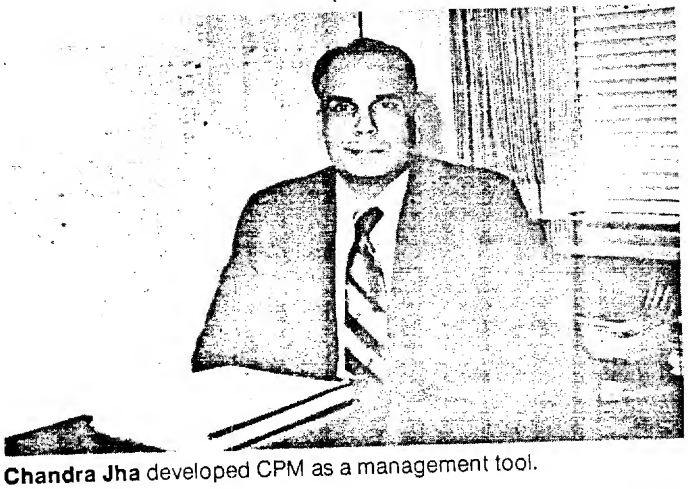
Chandra Jha is the developer of TISHCOM, the streamlined CPM used by Tishman Realty and Construction Co., Inc., New York City. As the holder of a master's degree in civil engineering and a master's in business administration, and formerly a CPM consultant, he was in a position to transform CPM into a manager's tool.

Jha took his ideas to Tishman in 1967 and explained how his system could streamline the cumbersome CPM and make it a profitable, sophisticated management tool. To develop the mechanics, Tishman gave Jha a free rein for 16 months.

The system was first used on the John Hancock Building in Chicago in 1967. "We ironed out the bugs in the system on that project," says Jha. "We also worked out the delicate introduction to the old-time construction men and supers." Then, after the system was fully refined, it was used on a 30-story reinforced concrete office tower in Chicago.

Jha's objective was to integrate CPM at all levels of management so that it could be used as a tool to control a construction project and keep it on schedule. Says Jha, "Construction men like to play it by ear—without any bogging-down paper work." With TISHCOM, every manager or super gets a minimum of paper and has little to update.

Before Jha joined Tishman, the company tried CPM on and off in 1965 and 1966, with mixed results. Jha had to convince management that the system itself was inherently sound but that its implementation was incorrect. Management bought the argument and has used TISHCOM on all of its jobs since. In the future, Tishman plans to sell the system as a separate package.



Chandra Jha developed CPM as a management tool.